



Policy on evacuation with companion animals, societal opinion and that of Dutch veterinarians.

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Summary

Forced evacuation of disaster areas without taking care of pets has shown to have major psychological consequences for pet owners. The Netherlands are constant at risk for floods since the most densely populated areas lie beneath sea-level. However there is no policy regarding pet evacuation in the Netherlands. To investigate if there is enough support from the population and Dutch veterinarians for the development of a national policy regarding pets during disasters, two surveys were conducted.

One survey was held among volunteers of the evacuation exercise “Waterwolf”. This survey was designed to evaluate if there was support for a new policy, investigate the determinants for quicker evacuation and evaluate the evacuation with pets during the exercise. In our small sample of 50 people most people supported the idea for a disaster policy regarding pets. Stimulating factors for evacuation seem to be under-aged children at home, other people in the neighbourhood evacuating as well, organised emergency shelters for people and collaboration between news networks and the government regarding risk communication towards people. At last the evacuation with animals was evaluated and the biggest problem was caused by rescuers that didn’t know that animals also participated in the exercise and what to do with them.

The second survey for Dutch veterinarians investigate the mind-set of vets towards a new disaster policy and communication framework regarding pets. This survey was completed in only 55 times. In this small sample 41 veterinarians agreed that a national policy regarding disaster care for pets would be useful. 27 vets voted that this policy should look like the HAROP model that is being used by Dutch general practitioners to prepare for an incident.

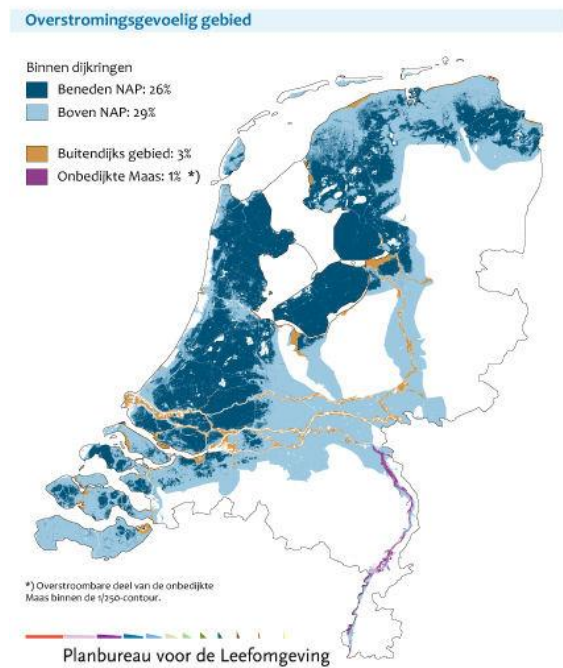
Introduction

Pet ownership has changed remarkably since the beginning when we domesticated animals. In ancient times, we used animals primarily for hunting and later keeping them for food. Pet ownership for companionship was rare in prehistoric history and in ancient civilizations and was preserved for the wealthy and mighty. Not until late 18th century we see pet ownership by the middle class. In the 19th century we see pet ownership as we know it today. However, still many pets, like dogs for example, are being used for manual labour. [1] In today’s society many people have animals at home and the number of pets is growing steadily. For example, there were 98 million cats as pets in the United States of America (USA) in 1980, in 2004 there were 130 million cats as pets in the USA. For some, these animals are means to generate income but for most others they are companions. Despite their purpose within the household, almost all people regard their animals as part of the family. Therefore, many people are willing to go to great lengths to ensure their safety and health. [2]

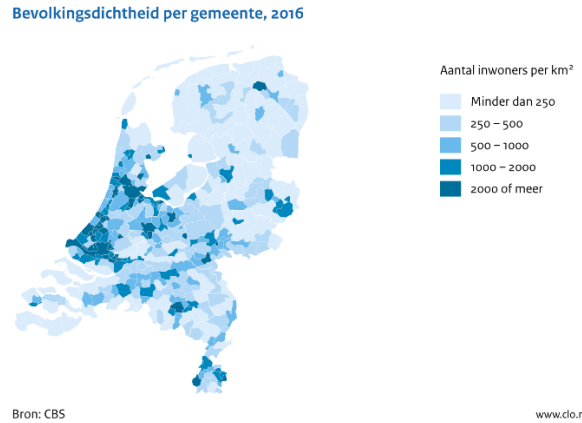
Natural disasters of huge proportions regularly occur in the United States of America and because of this, the physical and psychological consequences for humans and animals of disasters are well-known there. For example, during hurricane Katrina pet owners were forced to leave their pets at home during evacuation. Some people returned to their homes to care for their pets despite the high risks of their own safety. Many other pet owners that left their pets at home developed post-traumatic stress syndrome after the disaster through separation with their pet. Because pet loss during natural disaster can have major consequences, the government of the USA designed certain measures like the PETS Act (2006) to enable pet evacuation during natural disasters by rescue workers. [3]



But things are different in Netherlands for pets, there is no evacuation policy available for them. Even though the most densely populated areas of the Netherlands are below sea-level. Therefore, a flood could have serious consequences. Luckily only few large disasters have taken place in recent years. In 1953 the Netherlands was struck by the North Sea flood, and in 1995 the water level of the Rijn rose to a critical point and 250.000 people were evacuated. [4] But due to the rising sea level caused by global warming, the risk on a flood is increasing [5].



Picture 1. Map of the Netherlands showing areas beneath sea-level in dark-blue [6]



Picture 2. Map of the Netherlands showing densely populated areas in dark-blue [7]

Human crisis management is organised by 25 different safety agencies that are responsible for their own region in the Netherlands. These agencies are responsible for fire safety, disaster prevention, crisis management and the medical assistance organisation in the region (GHOR). [8] The GHOR can vary per region in participating organisations and individual responsibilities. But this group is assigned to organise health care for disaster victims. Many health services can be part of this GHOR including general practitioners. But this GHOR is only dedicated to humans. [9]

General practitioners are divided into 23 separate associations in the Netherlands, and another 52 separate groups for dividing shifts [10]. This makes cooperation with a GHOR slightly more complicated since there are 25 GHOR's and 23 GP associations. Therefore a model has been developed as a tool to aid collaboration between general practitioners and the GHOR. This model is called the HAROP-model¹. In the model, they advise to elect a “crisis coordinator” in every clinic or group of clinics. This “crisis coordinator” will attend to meetings of the local GHOR(s) (Due to different layout of the GHORs, some GP associations overlap with different regions of GHOR's). At these meetings, the crisis coordinator will speak on behalf of his

¹ HAROP-model: HuisArtsen Rampen Opvang Plan.



colleagues and agree upon which responsibilities they have during a disaster. This results in different responsibilities in different safety agencies for general practitioners. These agreements need to be written down and made accessible for every GP but also for other rescue workers and civilians in the region. [9]

Unfortunately clear communication and agreements are not sufficient to ensure good health care during disasters. Disaster settings are very different from the normal working conditions of general practitioners. Therefore it is vital that special training and practice is made available for them. [9]

There are also some practical issues addressed in the HAROP model like acquirement of required materials, financing, communication during a disaster (phone or other means of communication), registration of unfamiliar clients, catering during disasters and quality evaluation after an incident. [9]

However, until now there have not been an attempt to develop a policy on household pet evacuation in the Netherlands. This study's primary goal was to stimulate key players to start developing a policy regarding the evacuation of household pets in the future.

Secondary aims of this study were:

- To determine which factors motivate Dutch people to comply with an evacuation order.
- To evaluate the capacity of Dutch civilians to transport and care for their companion animals during evacuation conditions.
- To identify obstacles during evacuation with companion animals and develop recommendations to prevent or solve these.
- To investigate which kind of role Dutch veterinarians are willing to take to catalyse human evacuation with companion animals and make a recommendation how to include this in a policy.
- Make a recommendation for a policy of the evacuation of household pets.



Materials & Methods

This study focussed on two digital surveys, one specifically for participants of an evacuation exercise and the other survey was meant for Dutch veterinarians. Each of these surveys consisted of questions regarding their own personal situation, statements using a Likert-scale² answer model and open questions for personal opinions. A list containing all questions of both surveys are added to this report as attachments.

Participants for the first survey consisted of 100 volunteers that participated in the evacuation exercise “Waterwolf” that filled in their e-mail address when they signed up. There were no selection criteria for the evacuation exercise. This evacuation exercise was held on 2 and 3 November 2016 in the Netherlands on the island of Marken. The island of Marken was selected to be evacuated by joint effort of 35 different departments and businesses such as the local government, military, police department, ambulances, life guard and the fire department.

Marken was chosen because most of the island is beneath sea level and it was 100 years ago that Marken was flooded after a winter storm in 1916. Recurrence of this disaster is realistic due to the rising sea level and the vulnerable dikes of Marken. The aim of the exercise was to evaluate how well the different parties could work together and communicate in a disaster setting. This was also the perfect opportunity to start practising with the evacuation of animals. It was the first time that people practised evacuating animals together with humans in the Netherlands. The task of pet evacuation and care was divided over two students. One student focused on the evacuation of cattle and disinfection of transport trailers. The other was tasked to organise a rudimentary shelter for animals during the exercise, evaluate evacuation behaviour and investigate the willingness of

Dutch veterinarians to participate in disaster management, hence this report.

On the first day of “Waterwolf”, the local primary school and volunteers were evacuated by land. For exercise purposes, some people also took a stuffed animal with them to simulate pets during the exercise. Only a few people took a living animal with them. The children were evacuated from the local elementary school and volunteers were evacuated from the school and certain pick-up points. The evacuees were taken to the mainland. Here the trucks turned around and took the people to the shelter that was organised on the island itself. For the first time in the Netherlands an improvised shelter was used to take in pets from evacuees. This shelter was 500 meters away from the human shelter. It was situated in the canteen of the local football club. The shelter was very rudimentary, consisting only of 12 benches, administrative papers for registering the animals with their specific needs and owner, a veterinary student and eventually stuffed animals after evacuation. No volunteer was forced to leave their living animals behind and no one decided to do that.

On the second day of the exercise, the people were evacuated by sea. Animals were also evacuated on this day, but only on the first day of the exercise a shelter for animals was organised.

The volunteers for the emergency exercise had the opportunity to fill in their e-mail address when they signed up. This facilitated distribution of the digital survey via the organization of the emergency exercise. Before the start of the exercise, a document containing aspects regarding evacuation with animals was sent to the participants which would evacuate with a living animal. This hopefully increased the awareness of different factors of evacuation with animals and led to more accurate results in the survey after the exercise.

² A Likert-scale is an answer model used in surveys to measure attitudes or opinions. It makes use of a fixed choice response format that can consist of 5

to 7 or even 9 pre-coded responses with the neutral point being the value in the middle. [15]



The survey consisted of questions that will describe the demographic of the population (Age, education, income level, composition of the household, pet ownership etc.). These factors have been proven to have an influence on evacuation behaviour in the USA, but these factors could have other influences on European people. There were questions to evaluate if people are properly prepared for an evacuation with their pets. Certain statements investigate how sources of risk communication influences evacuation behaviour. These statements were answered using a Likert scale. Volunteers of the emergency exercise were also asked for their opinion regarding evacuation with animals and evaluate the evacuation exercise on this particular topic. It didn't matter if they had pets of their own or not, everybody was invited to let their opinion know. A list of the questions from the survey are added as an attachment to this report. I used the book "Basisboek Enquêteren" by Dr. B.D. Baarda as a guide to design my survey. [11] This book provides tips on designing hypotheses for a survey, compiling questions and designing the lay-out for example. With a well thought through survey and appealing design I wanted to achieve a high response rate among the participants.

An invitation e-mail was sent to the volunteers of the evacuation exercise on the 5th of November. Then every week a reminder was sent to the people that didn't completed the survey yet to acquire a high response rate. The survey was open till 12 December 2016.

The survey for Dutch veterinarians consisted of questions regarding their working situation, their opinion about an emergency policy and statements with a Likert-scale answer model. Also at the end of this survey we left space for participants to vent their own opinion regarding a policy on disaster veterinary care. The questions are added to this report as an attachment. This survey was advertised via the facebook, newsletter e-mail and the website of the Royal Dutch Society for Veterinary Medicine (KNMvD) and alongside my own network. This survey was open from the 22nd of December 2016 till the 30th of January 2017. This survey was also



made using the book "Basisboek Enquêteren" [11] as a guide.

To ensure that participants only wanted to share personal information they were comfortable with, no question in both surveys was required to be filled in. The results of both surveys were analysed using the statistical computer program SPSS 24 of IBM to describe the correlation between determinants and evacuation behaviour of people and determine how Dutch veterinarians are willing to assist.

After closure of the survey for participants of the exercise, the effects of the determinants were assessed. Statements regarding how quick people would evacuate were used as reference when comparing the different determinants. These statements included the following risks levels: 50%, 75% and almost certain (95%) that a flood will occur. Crosstabs will be used to achieve this comparison and evaluate their significance. For the calculation for p-values we used the Fisher's exact test instead of the Chi-squared test. This decision was made because of our small sample sizes. The Chi-squared test is based on some assumptions for it to be applied properly. One of these assumptions is that when using crosstabs, all cells within in the crosstab has a minimal value of 5 which couldn't be achieved in this study. The Fisher's exact test does not make use of any assumptions and calculates the exact probability. [12]

After assessing which determinants have relevant effect, logistic regression was used to further describe this effect. This was done by recoding the Likert-scale answers. The answers that were coded as 0 were people that disagreed with the statement or answered neutral, answers that were coded as 1 were people that agreed with the statement. Now with two different outcomes we can use logistic regression to determine what kind of effect some determinants have and how strong these are. Logistic regression results in a simplified representation of a real-world situation or process that describes the relation between a numerical explanatory variable and a numerical outcome variable where the outcome is binary. This representation produces a coefficient (B-value) that describes if an explanatory variable has a negative or positive effect and how large this effect is on the outcome variable. By taking

the exponential of the coefficient ($e^{B\text{-value}}$), the estimated odds ratio can be obtained for a specific explanatory variable. This odds ratio is an indication how much larger the chance is for a particular outcome. For example, if the odds ratio for disease is 2,6 for people with red cars, then the risk for people with red cars of getting the disease is 2,6 times greater than people who have a car with another colour. If an odds ratio for a determinant is lower than 1, the relative risk for the particular outcome is smaller. [12]

Results

Survey for the volunteers

A total of 100 participants entered their e-mail address when they signed up. Eventually a total of 58 people participated in the survey, but 8 of them did not complete it. Due to the small number of participants, the Fisher's exact test was used to calculate all p-values. A higher critical p-value was taken into account to show significance of determinants. This decision has been made because due to the small sample size. The critical p-value used in this study was 0,2.

Factors that increased the likelihood of evacuation were sources of information regarding the risk of disaster, under aged children at home, people in the neighbourhood that also evacuate and organised emergency shelters for humans.

Factors that decreased the likelihood of evacuation in households were having a higher level of education, having food reserves and supplies at home for at least 72 hours, a higher income, house ownership, multiple pets at home and own independent transportation for the whole household. In table 1 are the different determinants listed and what kind of effect they had in our population sample.

Some determinants did not show a great influence on evacuation behaviour or were excluded from this study due to bad sample proportions. As an example, age was excluded from this study due to the disproportionate distribution of the



sample. 73% of the people whom participated in the survey were at least 46 years of age, which is not representative for the rest of the population of the Netherlands.

The size of the household, living nearby large bodies of water, having a place at family or friends where you can evacuate to, organised shelter for pets or the duration someone lived at their current address did not seem to have major effect on evacuation behaviour.

Effect on evacuation behaviour	+ Stimulating determinants	- Inhibiting determinants
	Under aged children	Higher education
	Other people evacuating	Home ownership
	Organised shelter for humans	Higher income
	Government and news networks as source of information	Multiple pets
		Own transportation

Table 1. Overview of determinants with their effects on evacuation behaviour.

Stimulating determinants

One of the major effects on evacuation behaviour can be attributed to the source of information regarding the risk. When comparing the likelihood of evacuation with regard to the information source, the government had a more stimulating effect rather than news networks alone. But when news networks and government work together, the willingness to evacuate could increase even more. This is shown in table 2 and graph 1. In this table a higher the score means that people were more stimulated to evacuate.

Another factor that increased the likelihood of evacuation by a household are under aged children. If there are more children in the household, the family is more likely to evacuate faster than households with no under-aged

children. However at higher risks, under-aged children seemed to be a inhibiting factor. Households with under-aged children had an odds ratio of 4,2 (p-value 0,17) for evacuation when compared to households with no under-aged children at risk of 50% according to both the government and news networks.

Descriptive Statistics

	N	Mean	Std. Deviation
Evacuation willingness at 50% risk according to the government	49	3,2	1,2
Evacuation willingness at 75% risk according to the government	50	3,9	1,1
Evacuation willingness at 95% risk according to the government	52	4,4	1,0
Evacuation willingness at 50% risk according to news networks	47	3,2	1,1
Evacuation willingness at 75% risk according to news networks	46	3,7	1,0
Evacuation willingness at 95% risk according to news networks	48	4,2	0,9
Evacuation willingness at 50% risk according to the government and news networks	47	3,6	1,0
Evacuation willingness at 75% risk according to the government and news networks	46	4,1	1,0
Evacuation willingness at 95% risk according to the government and news networks	48	4,5	0,9

Table 2. Probability of evacuation tested at different risks communicated by different sources. People indicated how probable it was they would evacuate with different risks communicated by different sources. The score 1 was highly improbable, 2 improbable, 3 neutral, 4 probable, 5 highly probable.



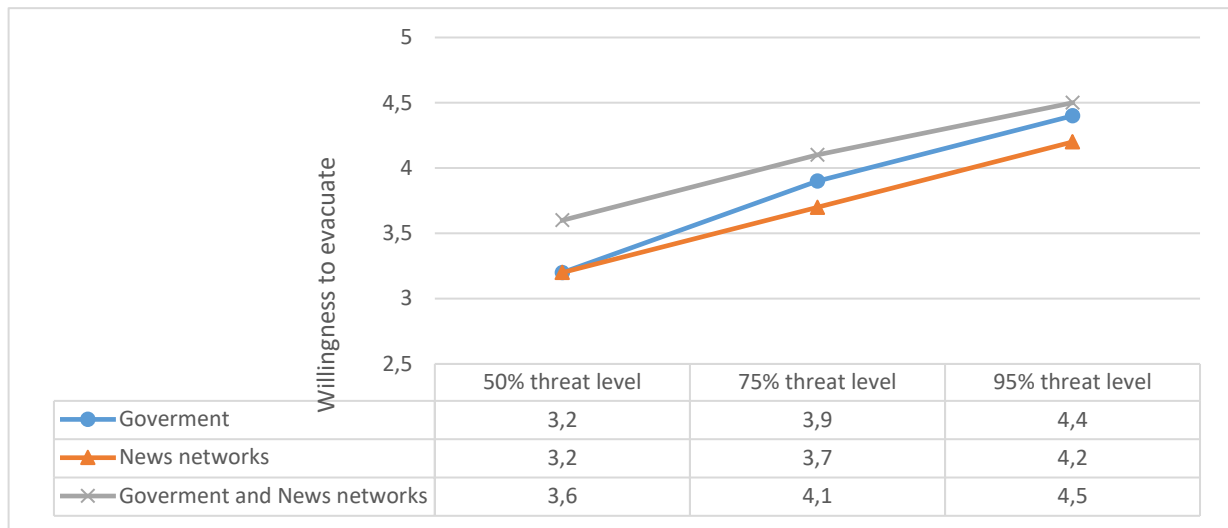
The survey also included two questions if people would evacuate if other people in their neighbourhood also evacuated and if people would evacuate when they know shelter was organised for them. These questions also were answered using a 5 point Likert-scale. This way the participants could indicate how much they agreed with the statement, with 1 being high unlikely to 5 high likely. 75,5% of the people responded with a 4 or 5 when people in their community also evacuate. This means that 37 of 49 (75,5%) people that answered the question agree that they will be more tempted to evacuate when others also evacuate. 58,6% percent were more likely to evacuate when they know a shelter was available for them.

Inhibiting determinants

One major influencing factor on evacuation behaviour was education. People could indicate which was the highest level of education they completed. At first glance it looks like higher education stimulates evacuation at lower risks of disaster. Participants with higher level of education voted relatively higher on the Likert-scale at lower risk percentages than people with lower education. When the risk increased, people with lower level of education increased their scores while participants with higher level of education did not change their score by much. At the highest risk scenarios, almost all people with lower education level voted they would evacuate. But people with the highest level of education scored only slightly higher than their vote at the lowest risk scenario.

In table 3 the distribution of education among the participants is described. In graph 2 the mean scores of the different groups are displayed. Here you can see that higher educated people were not more willingly to evacuate at higher risks than at lower risks.

Another factor that seemed to inhibit people to evacuate is property ownership. People were less likely to evacuate when they own their house when the risk of flooding is still low. In the scenarios with risks of 50% and 75% of flooding of their homes, the home owners were more likely to stay at home. In the scenario with 50% risk of flooding according to the news, home owners had an odds ratio of 0,36 to



Graph 1. Probability of evacuation tested at different risks communicated by different sources.

evacuate relative to people who rent their home with an p-value of 0,17.

The number of pets also influenced the probability that a household would evacuate. More pets will result in a lower chance on evacuation. This factor has not the biggest effect when compared to other factors. The most negative B-value produced in the different scenarios is -0,295 with an p-value of 0,165 while using logistic regression. The estimated odds ratio of this determinant was 0,74. This means that having more than one pet could decrease the chance of evacuation with 26% when compared to people with a single pet.

Own transportation looked like a stimulating factor for evacuation when looking at the lower risk scenarios. In these scenarios, the odds ratio can reach 2,8 with an p-value of 0,16 when using logistic regression. This means that people whom have their own vehicle to transport their household were 2,3 times more likely to evacuate. But in the scenarios starting with 75% risk, people without own transportation started to evacuate. People with own transportation however, were far less likely to change their decision not to evacuate despite the higher risk.

In the survey 45 people indicated to be able to transport their whole household on their own with food, water and supplies. 20 of these people had pets. 12 people could not evacuate independently, of which 4 had pets.

Only 2 volunteers who filled in the survey participated with a live pet during the exercise and 3 people with stuffed animals. One of the obstacles that was encountered was that it was unknown for some rescuers that pets were included in the exercise. This led to some debate among the rescuers when some volunteers wanted to board the evacuation transports or wanted to enter the emergency shelter.

At the human shelter there was some confusion whether animals were allowed. The special shelter for animals that was set-up approximately 500 meters away was unknown for some part of the rescue workers. Amongst the confusion some pet owners started to walk towards the shelter for animals, while others organised motorised transportation to the animal emergency shelter.

Nowadays many pets are considered full-fledged members of the family. This could make separation of pets and their owners traumatic. People suggested that there should be a counsellor stationed at the pet shelter to ease separation between pets and humans. Other participants suggested to organize the animal shelter right beside the human shelter to minimize the distance between pets and their owners.

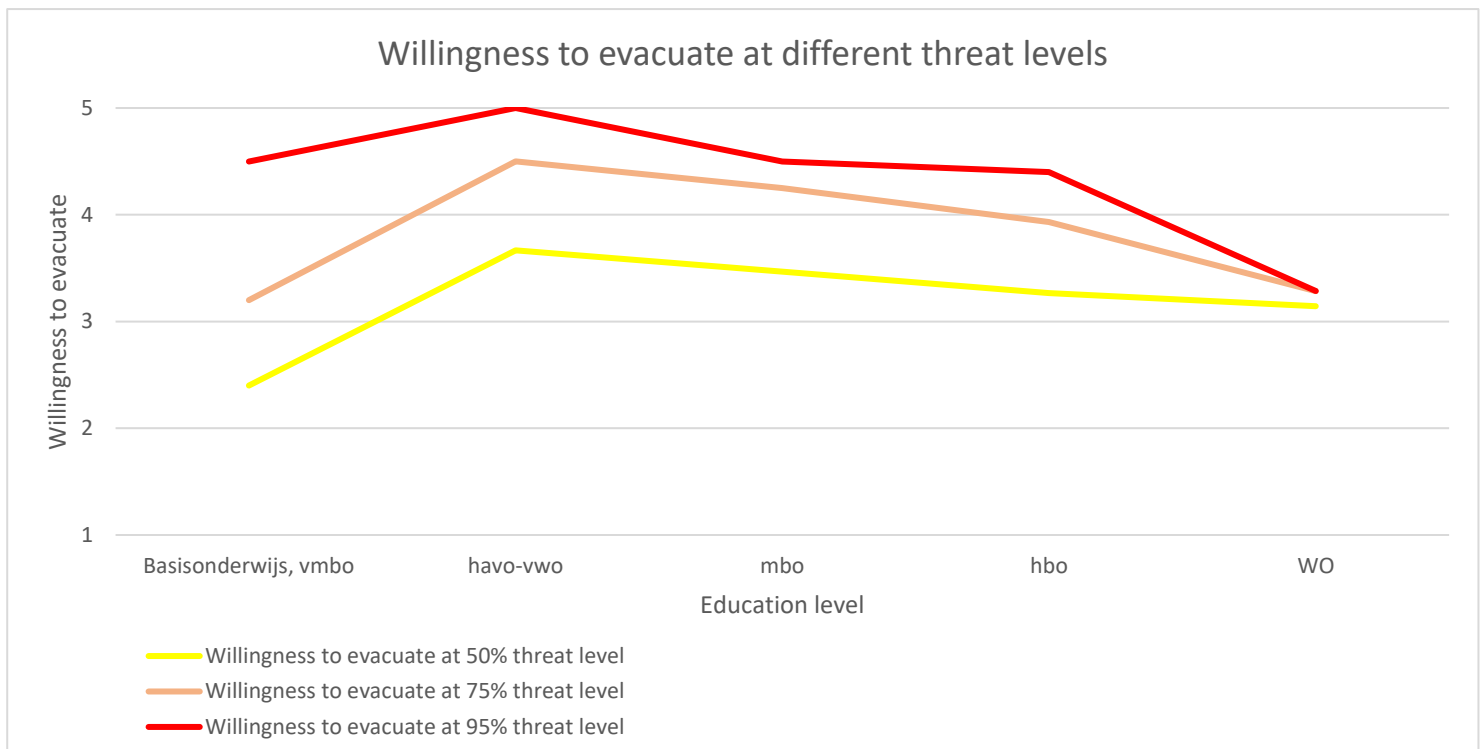
Most people that participated without animals commented that the exercise with animals was very useful and supported the animal evacuation while there was only 1 person which indicated that animals took up too much space during evacuation.



What level of education did you complete?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Basisonderwijs, vmbo	7	12,1	12,5	12,5
	havo-vwo	8	13,8	14,3	26,8
	mbo	18	31,0	32,1	58,9
	hbo	16	27,6	28,6	87,5
	WO	7	12,1	12,5	100,0
	Total	56	96,6	100,0	
Missing	System	2	3,4		
Total		58	100,0		

Table 3. Distribution of education levels among the participants of the survey.



Graph 2. The graphs display the mean scores of evacuation probability by people with different levels of education.



Survey for the veterinarians

After closure of the survey for the Dutch veterinarians, 55 veterinarians completed the survey. 15 (27,8%) participants were owner of a practice, 35 (64,8%) were employed, 2 (3,7) were both owner and employed, 1 (1,9%) veterinarian worked as a substitute for other veterinarians and 1 (1,9%) did not work in a practice. 52 (96,3%) of the participants worked with companion animals like dogs and cats in their work, and most of them also on rabbits and rodents. 7 (13%) of the participants worked with horses, 5 (9,3%) with cattle, 2 (3,7) with pigs and 1 (1,9) with poultry. Only 3 (5,6%) veterinarians also included exotic animals like reptiles or zoo animals in their work field. Most of the participating vets (87%) were active at a non-specialised practice. Only 7 (13%) worked at a specialised clinic.

Most of the veterinarians responded that they have never helped in a disaster setting. Only 7 (13%) participants said that they have worked under these circumstances. Most of them involved a fire or flood. 3 (5,5%) veterinarians received training in the last 5 years regarding emergency medicine for pets. And there was only 1 (1,8%) practice which had a disaster guideline at the ready.

We asked the veterinarians if they find it useful if there was a national guideline regarding veterinary care during national disasters. 41 (74,6%) agreed that a national guideline would be beneficial, 14 (25,6%) disagreed. There was no real difference between employed vets and clinic owners regarding this topic. But their working field (companion animals, farm animals) seems to have an effect. 13 of 52 (25%) vets who work with companion animals disagreed with the statement. But all vets who worked with farm animals agreed with the statement.

Veterinarians who agreed with the statement were then asked how this disaster guideline should look like. We referred to the HAROP model as an example. The HAROP model is used by Dutch general practitioners to form their communication framework for disaster response in conjunction with other regional medical services in the GHOR. 27 (65,9%) veterinarians agreed that an adaptation of the HAROP model could be used for the veterinary sector and could help implementation into a GHOR, 14 (34,1) voted neutral in this matter.

Also, practice owners were prepared to aid victims from disaster regions. 13 practices were willing to offer assistance in the form of materials (medicine, bandages etc.). 10 of 15 practice owners were prepared to offer shelter and care for animals and 11 could send staff for triage and treatment for animals. Of these 11 practices, 10 offered to let their staff work at another location outside the clinic. We asked how much distance they were willing to travel to offer help at location, and the mean distance they were willing to travel was 40,5 kilometres from their home place.

All vets were then confronted with statements how much they are willing to do in order to set-up and maintain a disaster protocol. In the HAROP model one person per practice or group of practices is assigned to maintain contact with the other medical organisations. 34 of 50 (68%) veterinarians are willing to participate in this kind of communication structure. 24 (48%) vets were willing to assist in the development of specific disaster courses which 42 (84%) vets were willing to follow. Outside working hours 39 (78%) vets were willing to help when a disaster happens in the Netherlands.

At the end of this survey we left space for participants to write down their personal opinion regarding a policy on disaster veterinary care. Most of the received comments were positive but there were some practical concerns like time management and financial concerns.



Discussion

This study's aims were to determine factors which motivate Dutch people to comply with an evacuation order, evaluate the capacity of Dutch civilians to transport and care for themselves and their pets during evacuation conditions, identify obstacles during evacuation regarding pets and develop recommendations to prevent or solve these, investigate the mind set of Dutch veterinarians regarding a disaster communication structure and make a recommendation for a policy for the evacuation of household pets.

Volunteers who participated in the emergency evacuation exercise "Waterwolf" were asked to fill in a survey regarding their own situation, their willingness to evacuate in different scenarios and their personal opinion about the evacuation regarding pets. There were only 100 registered e-mail addresses of the volunteers. All of them were invited to fill in the survey, but only 58 did fill in the survey of which 50 of them totally completed the survey. This resulted in a very small sample size which makes interpretation of the results troublesome. One of the aims of the survey was to identify determinants that motivates Dutch people to evacuate. A sample of 50 people is too small to get significant results, stand-alone representative results regarding the entire population. For example, not all age groups are correctly represented.

One of the most evident effects from this study is the higher compliance of people when government and news stations report comparable findings and don't contradict each other. Even if the sample size was small, this effect is high likely to occur when bigger populations are to be evacuated. This can be implemented in a policy.

In our sample, under-aged children in households were a factor which stimulate people to comply with an evacuation order. This determinant is high likely to have the same effect in the rest of the Dutch population.

Another major stimulating determinant were the people in the neighbourhood, 75,5% of our small sample were more willingly to evacuate when others are also evacuating. Community leaders can be convinced to assist with the evacuation or evacuate themselves to stimulate other people to evacuate. Assistance can be in the form of personal visits to people in the neighbourhood to warn them about the dangers of staying at home and convince them to leave. This personal approach seemed highly effective in the USA [13].

One surprising result is that higher educated people were less willingly to evacuate. We can only speculate why this is. It could be because higher educated people look for other sources for information regarding their own risk and make their own estimation.

People who own their house also were less likely to evacuate too. This is not very surprising because most people spent a lot of money and time in their home. This will result in more reluctance to abandon their home.

Pet ownership itself did not seem to be a factor to influence evacuation behaviour due to the very high p-values this determinant produced during analysis. However, this could not be said for the number of pets in a household. A higher number of pets resulted in a decreased willingness to evacuate.

As a final factor, individual transportation seemed to be a stimulating determinant to evacuate at lower risks. At higher risks, it seems that people without their own transportation are more easily convinced to evacuate. People with their own transportation however, stick with their decision to stay at home at higher risk levels.

A different goal of this study was to identify obstacles during pet evacuation. The biggest problem was the confusion among rescuers because they didn't what to do with pets that participated in the exercise. This led to discussions at trucks and busses when people were boarding with a pet, causing delays. Other people were sent away at the shelter with their pet without any guidance to where they should go. These are situations that can be prevented



by instructing the rescuers clearly about animals and offer training how to handle them.

Another goal of this study was to evaluate the capacity of Dutch people to transport and care for their household under evacuation conditions. Luckily most people in our sample were able to transport themselves including their pets. However, there are some people who can't. 12 people in our sample are not able to transport themselves over a larger distance, of which 4 of them had pets. These people are dependent on public evacuations to be able to get out of the disaster region. Some of these people had pets that they want to be able to take with them. Rescuers should be prepared for this and special trucks or busses should be prepared to evacuate pets along with their owners.

The survey for the veterinarians resulted in 55 replies. This sample size is not sufficient to draw hard conclusions because there are 3.225 veterinarians in practice in the Netherlands [14]. That is why we need to be careful when we interpreted the results.

In our sample, there was not a lot of experience regarding giving care to disaster victims. And almost no plans are made to cope with a disaster in their own or at another region. Nevertheless, most of the veterinarians were willing to participate in a disaster communication structure and even follow classes so they can be prepared when disaster strikes.

The HAROP model as used by general practitioners was regarded by the vets as a good starting point as a base for a veterinary disaster communication framework. This framework will give veterinarians tools to set-up their communication with other veterinary services like animal shelters and the Dutch Society for the Protection of Animals.

But communications alone does not help disaster victims with their troubles. Staff needs to be willing to help people when disaster strikes and luckily most of our sample was willing to help. Not only with providing materials, but also with sending staff to another location to set-up a shelter and medical station for pets. This is



crucial for a successful national policy for practices. If practices were not willing to provide materials and staff, then it is maybe better to form a national veterinary response team.

Such a disaster framework needs to be maintained even when there is no disaster unfolding. Also for this we found support in the form of people who were prepared to contribute as a contact and people who were willing to develop and organize education dedicated to disaster settings.

Conclusion

In our limited samples of volunteers and Dutch veterinarians, we see a general support for the development of a disaster policy regarding veterinary care.

Most people from our sample were able to transport and care for their animals during evacuation. But there are some people that cannot achieve this. To assist those people and pets it is vital to include them in a policy. Rescue workers need to be well instructed beforehand what to do with animals when they need to be transported as well to prevent delays and unnecessary discussions.

Not only transportation of the pets needs to be implemented, also shelter need to be organised. Due to health risks (like bite incidents, allergies, infectious diseases and such) it is better not to shelter animals at a human emergency shelter. An organised emergency animal shelter or already existing animal shelters, pet stores, veterinary practices and hospitals could provide shelter for animals if necessary. Local hotels can also be useful for people with animals so they won't need to be separated.

To estimate how much material, food, water and medicine is required to shelter pets, it is vital to know how much pets need to be relocated. In the Netherlands it is mandatory to chip and register dogs and horses. This makes it easier for emergency services to estimate the maximum number of dogs and horses that they can expect to transport or provide shelter for. But it is not mandatory to chip other animals like cats, rabbits, rodents and such. Which makes estimation of the total number of

animals in a region more difficult. Using statistical data, a rough estimation of pets can be made for a designated region.

18 percent of Dutch households own a dog and 23 percent a cat [14]. With this data you can roughly estimate the number of pets when you need to evacuate 15.000 homes for example by multiplying 15.000 by 0,18 (2700) for dogs and 15.000 by 0,23 (3450) for cats.

Furthermore, have different kinds of animals their own special needs which makes it a challenge to organise a shelter for all different animals. It is best to investigate before an incident where different kind of animals can be transported to in the region where proper care can be offered to them.

The HAROP model as used by general practitioners seems like an excellent starting point to develop a disaster communications policy by veterinarians. This would improve communications during disaster circumstances between veterinarians. But it can also include more animal welfare organisations, such as the Dutch society for the protection of animals. This way you have more staff available for different tasks during an incident.

When a basis for disaster communication has been realised, different responsibilities need to be divided among the different veterinary services. Tasks that need be to discussed are for example transportation of animals, organising shelter for animals, giving care to animals and perform veterinary actions when needed. Then the organisations need to be properly equipped and trained for their designated tasks.

According to our sample are Dutch veterinarians willing to participate in training and practise for future disasters. This training will need to be developed from the ground up but will result in better performance when they are faced with a disaster setting.

All veterinary care services are still excluded from the human disaster organisations like the GHOR. When veterinarians make use of the HAROP model, it will create an opportunity for cooperation with the GHOR without much adaptation. This hopefully results in a coordinated health care approach for humans and their animals.

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References

- [1] Pedigree, „The Evolution of Pet Ownership,” [Online]. Available: <http://www.pedigree.com/all-things-dog/article-library/the-evolution-of-pet-ownership.aspx>. [Geopend 4 1 2017].
- [2] A. Ng, M. Hall, R. Ursano, H. Holloway, C. Fullerton and J. Casper, „Psychological impact of the animal-human bond in disaster preparedness and response.,” *Journal of Psychiatric Practice*, nr. 10, pp. 368-374, 2004.
- [3] M. Hunt, H. Al-Awadi and M. Johnson, „Psychological sequelae of pet loss following Hurricane Katrina.,” *Anthrozoös*, pp. 109-121., 2008.
- [4] watervragen, „Overstromingen,” 2013. [Online]. Available: <http://www.watervragen.nl/overstromingen-in-nederland>. [Geopend 5 1 2017].
- [5] J. H. Diaz, „The influence of global warming on natural disasters and their public health outcomes.,” *American journal of disaster medicine* , pp. 33-42, 2006.
- [6] Planbureau voor de leefomgeving, „Correctie formulering over overstromingsrisico Nederland in IPCC-rapport,” 2010. [Online]. Available: <http://www.pbl.nl/publicaties/2010/Overstromingsrisicozonering-in-Nederland>. [Geopend 26 7 2017].
- [7] Compendium voor de Leefomgeving, „Bevolkingsgroei, 2011-2016,” rijksoverheid, 2016. [Online]. Available: <http://www.clo.nl/indicatoren/nl2102-bevolkingsgroei-nederland->. [Geopend 26 4 2017].
- [8] Nationaal Coördinator Terrorismebestrijding en Veiligheid, „Veiligheidsregio's,” [Online]. Available: Nationaal Coördinator Terrorismebestrijding en Veiligheid. [Geopend 23 4 2017].
- [9] C. Cools, C. Dekkers, L. Romijn, M. Smeekes, K. In 't Veld, C. Van Vugt and R. Houdijk, „Model huisartsen Rampenopvangplan,” [Online]. Available: <https://www.lhv.nl/service/model-huisartsen-rampenopvangplan>. [Geopend 23 4 2017].
- [10] Landelijke huisartsen vereniging, „Huisartsenkringen,” 2017. [Online]. Available: <https://www.lhv.nl/vereniging/organisatie/huisartsenkringen>. [Geopend 9 5 2017].
- [11] B.D. Baarda, M.P.M. de Goede and M. Kalmijn, Basisboek Enquêteeren, Groningen/Houten: Wolters-Noordhoff, 2007.
- [12] A. Petrie and P. Watson, Statistics for Veterinary and Animal Science, Oxford: Blackwell Publishing, 2006.
- [13] L.J. Dotson and J. Jones, „Identification and Analysis of Factors Affecting Emergency Evacuations,” Washington, 2005.
- [14] HAS Hogeschool, Universiteit Utrecht, „Feiten & Cijfers Gezelschapsdierensector 2015,” HAS Hogeschool, Den Bosch, 2015.
- [15] S. Mcleod, „Likert Scale,” Simply Psychology, 2008. [Online]. Available: <https://www.simplypsychology.org/likert-scale.html>. [Geopend 9 5 2017].



Attachments

Attachment 1: List of question of the survey for volunteers

This is only a list of the questions that were asked in the survey with available answers. The real survey was designed on surveymonkey and was in Dutch.

1. What is your highest level of finished education?
 - Primary education
 - vmbo-mbo1
 - havo-vwo
 - hbo
 - WO
 - Other, I would rather not share

2. What is your age in years?

3. How many people live at your home (including yourself)?
 - 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - >7

4. How many under-age children live at your home?
 - 0
 - 1
 - 2
 - 3
 - 4
 - >4

5. Do you have pets?
 - Yes
 - No
 - a. What kind of pets do you have? (multiple answers possible)
 - Dog
 - Cat
 - Rabbit
 - Rodent
 - Bird
 - Other, ...



- b. How many pets do you have?
- 1
 - 2
 - 3
 - 4
 - Other, ...
6. Is your home situated near (<150 meters) a big body of water (river, lake, sea)?
- Yes
 - No
 - I would rather not share
7. Do you live in a bought home or a rent house?
- Rental home
 - Bought home
 - I would rather not share
8. How long are you living at your current address?
9. What is the total income of your household per year in euro's?
- 0-12.000
 - 12.001-24.000
 - 24.001-36.000
 - 36.001-48.000
 - 48.001-60.000
 - 60.001-72.000
 - 72.001-84.000
 - 84.001-96.000
 - 96.001-108.000
 - >108.000
 - I would rather not share
10. Do you have 72 hours of food and water available for your household at home?
- Yes
 - No
11. Do you have a survival pack (Med-kit, torchlight, batteries etc.) available for 72 hours at home?
- Yes
 - No
12. Are you able to independently transport your household including pets with proper amount of food, water and supplies?
- Yes
 - No
13. Do you got a back-up address where you can take shelter with your whole household in case of an emergency?
- Yes
 - No
 - No idea



14. Did you have to evacuate in the past 10 years by the government?
- Yes
 - No
- a. Did you have to unnecessarily evacuate by the government in the past 10 years?
- Yes
 - No

Statements

15. I will evacuate when the risk is 50% regarding a flood happening according to the government.
- High unlikely
 - Unlikely
 - Neutral
 - Likely
 - High likely

16. I will evacuate when the risk is 75% regarding a flood happening according to the government.
- High unlikely
 - Unlikely
 - Neutral
 - Likely
 - High likely

17. I will evacuate when the risk is almost certain regarding a flood happening according to the government.
- High unlikely
 - Unlikely
 - Neutral
 - Likely
 - High likely

18. If answered unlikely or high unlikely at question 15-17, why won't you evacuate?
-
-
-

19. I will evacuate when the risk is 50% regarding a flood happening according to news networks.
- High unlikely
 - Unlikely
 - Neutral
 - Likely
 - High likely

20. I will evacuate when the risk is 75% regarding a flood happening according to new networks.
- High unlikely
 - Unlikely
 - Neutral
 - Likely
 - High likely



21. I will evacuate when the risk is almost certain regarding a flood happening according to new networks.

- High unlikely
- Unlikely
- Neutral
- Likely
- High likely

22. If answered unlikely or high unlikely at question 19-21, why won't you evacuate?

.....
.....
.....

23. I will evacuate when the risk is 50% regarding a flood happening according to the government and news networks.

- High unlikely
- Unlikely
- Neutral
- Likely
- High likely

24. I will evacuate when the risk is 75% regarding a flood happening according to the government and news networks.

- High unlikely
- Unlikely
- Neutral
- Likely
- High likely

25. I will evacuate when the risk is almost certain regarding a flood happening according to the government and news networks.

- High unlikely
- Unlikely
- Neutral
- Likely
- High likely

26. If answered unlikely or high unlikely at question 23-25, why won't you evacuate?

.....
.....
.....



27. I tend to evacuate earlier when people in my neighbourhood also evacuate.

- High unlikely
- Unlikely
- Neutral
- Likely
- High likely

28. I tend to evacuate earlier when I know there is shelter organised for me.

- High unlikely
- Unlikely
- Neutral
- Likely
- High likely

29. I tend to evacuate earlier when I know if there is a shelter organised for my pets at an animal shelter.

- High unlikely
- Unlikely
- Neutral
- Likely
- High likely
- N/A

30. I tend to evacuate earlier when I know there is shelter organised for my pets at a special set-up animal shelter by the crisis response team.

- High unlikely
- Unlikely
- Neutral
- Likely
- High likely
- N/A

31. I tend to evacuate earlier when I know there is a veterinarian present at the shelter for animals.

- High unlikely
- Unlikely
- Neutral
- Likely
- High likely
- N/A

Evaluation of evacuation exercise “Waterwolf” regarding animal evacuation.

1. Did you participate in the exercise with a pet/stuffed animal?

- Yes
- No

If yes continue with question 2, if no continue with question 8.



2. Could you take everything with you for you and your pet?

Yes

No, explanation:

.....
.....
.....

3. Could you and your pet board the evacuation bus?

Yes

No, explanation:

.....
.....

4. Were there delays when boarding the bus by taking your pet with you?

No

Yes explanation:

.....
.....
.....

5. Were there issues regarding animal handling of your pet by rescuers?

No

Yes explanation:

.....
.....
.....

6. Could you leave your pet at the animal shelter?

Yes

No explanation:

.....
.....
.....

7. Do you have any other remarks regarding evacuation with pets?

.....
.....
.....

End of the survey for pet owners.



8. Did you have trouble with animals during transportation with the bus?

No

Yes explanation:

.....
.....
.....

9. Were there any delays when boarding the bus by caused by pets?

No

Yes explanation:

.....
.....
.....

10. Do you have any other remarks regarding evacuation with pets?

.....
.....
.....

End of the survey.



Attachment 2: List of question of the survey for Dutch veterinarians

This is only a list of the questions that were asked in the survey with available answers. The real survey was designed on surveymonkey and was in Dutch.

1. Did you ever had to help with the care of pets that were involved in a disaster?
 - No
 - Yes, Explanation:
.....
.....
.....

2. Do you think that there should be a national policy regarding veterinary care for pets in and from disasters areas?
 - Yes
 - No

5a. If answered yes at question 5: This national policy should be comparable as the HAROP model used by general practitioners.

 - Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree

3. Is there a protocol present at your clinic regarding disasters (for both natural and human caused disasters)?
 - Yes
 - No

4. Did you receive training in the last 5 years regarding emergency shelter medicine?
 - Yes, Explanation.....
 - No

5. With which kind of animals do you work with? (multiple answers possible)
 - Dogs and cats
 - Rabbits and rodents
 - Birds
 - Horses
 - Cattle
 - Poultry
 - Pigs
 - Other, Explanation

6. At what level are you active?
 - Common practice
 - Specialised surgical practice
 - Specialised internal practice
 - Other, Explanation



7. Which describes your situation best?
- I am practice owner.
 - I am employed
 - Other, Explanation

If you are a practice owner please continue with question 13, if your employed or other please continue with question 8.

8. I am willing to be part of a disaster communication framework.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree

9. I am willing to aid in the development of training in emergency shelter medicine.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree

10. I am willing to follow training in emergency shelter medicine.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree

11. Outside opening hours, I am prepared to be on call regarding aid for pets struck by disaster.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree

11a. How much kilometres are you willing to travel to aid pets stricken by disaster?
 km

12. Do you have any remarks regarding a national policy or your motivation to support such a policy for a veterinary disaster communication framework?

.....

End of survey for people in employment or other.



13. I am able and willing to shelter pets from disaster areas in my practice.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree
14. My practice can offer staff for triage and treatment for evacuated pets of regular customers and unfamiliar people.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree
- 14a. If answered agree or strongly agree:
- | | | |
|--|---------------------------|--------------------------|
| People can come to the practice for veterinary care. | <input type="radio"/> Yes | <input type="radio"/> No |
| I can send staff to another location to provide veterinary care. | <input type="radio"/> Yes | <input type="radio"/> No |
15. How much kilometres are you willing to travel to aid pets stricken by disaster?
..... km
16. I can offer material (for example, bandages, medicine and instruments) to a post where veterinary care is offered to evacuated pets.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree
17. I am willing to be part of a disaster communication framework.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree
18. I am willing to aid in the development of training in emergency shelter medicine.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree
19. I am willing to follow training in emergency shelter medicine.
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree



20. Outside opening hours, I am prepared to be on call regarding aid for pets struck by disaster.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

21. Do you have any remarks regarding a national policy or your motivation to support such a policy for a veterinary disaster communication framework?

.....

.....

.....

End of the survey

